

## B.6 ROADING GUIDELINES FOR GAS EXPLORATION AND DEVELOPMENT WITHIN THE RILEY RIDGE PROJECT AREA

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### APPLICABLE ROAD STANDARDS

The primary road access that an operator will be using will be either a county road or FS/BLM arterial, collector, or local road, or combination of these. In most cases, the actual work site will be some distance removed from the nearest road. The operator may gain access to the work site by locating, designing, and constructing a "temporary road" from a FS or BLM development road to the work site.

The existing FS/BLM and county roads are usually inadequate to facilitate the type and volume of traffic required for exploration and/or development of oil or gas reserves. Prior to use by an operator, the road must be upgraded at the operator's expense to the standard compatible with the proposed road use and FS and BLM classification.

### FOREST AND BLM DEVELOPMENT ROADS

Arterials. For purposes of the Riley Ridge Project EIS well field, these are roads that service the entire well field or primary access to plant sites. A FS/BLM or other arterial shall be a double-lane, graded, drained, and surfaced road. The roadbed shall be crowned on tangents and superelevated on curves. The traveled way shall be between 20 and 24 feet in width, depending on the total anticipated traffic and environmental considerations on a site-specific basis. The minimum surface depth on all roads shall be 4 inches of crushed aggregate base or 6 inches of pit run gravel. The typical cross section for a double-lane road is as shown in the "typical sections." Culverts or bridges shall be installed at all minor stream crossings.

Collectors. For purposes of the EIS, these are roads that service several wells. A FS/BLM or other collector shall be either a 14-foot single-lane road with turnouts or a 20 to 24-foot double-lane road. The anticipated traffic volumes will be the basis for determination of the particular standard for a specific road. In many instances, the operator's proposed additional traffic will be sufficient to require upgrading the existing road to a higher standard. If the projected average daily traffic (public, commercial, administrative, operator) exceeds 100 vehicles per day, a double-lane facility will be required.

Locals. For purposes of the Riley Ridge Project EIS, these are roads that service one well. A FS or BLM road shall be a 14-foot wide single-lane road with intervisible turnouts.

Before construction, the FS or BLM (depending upon land status) will determine whether a local road will be obliterated and reclaimed at the completion of the exploration work, assuming a dry-hole is encountered, or whether it will be retained by the FS or BLM and added to the Forest Development Transportation System or the BLM District Transportation Plan. In the latter instance, the road will be constructed with turnouts. However, if it is not to be retained, it may be constructed without turnouts depending on the operator's proposed activities and FS or BLM recommendations as to management.

#### TEMPORARY ROADS

The term "temporary road" should not be interpreted to imply a lesser standard of construction. Policy is to require that road access to drill sites be properly located, designed, constructed, and maintained by the leasee and/or drilling operator. Such things as FS or BLM directional signs, bridge guard rails, and reduced numbers of turnouts (with appropriate management guidelines) can be designed. A temporary road will be obliterated, if the hole is dry, to requirements that will be described in the EIS/EA process.

#### PERIOD OF USE

The complexities of drilling in the Overthrust require that the design of roads accommodate all seasons of use unless the operator is willing to accept road closures due to weather. This means designing roads for all-weather access from frost heave to wet soils to dry conditions. The surfacing requirements on any road used by the operator will be dependent upon the type of soils on which the road is constructed. If snow removal will be required on graveled surfaces, additional thickness for anticipated loss must be included.

#### ROAD LOCATION

Access to work sites may require the construction of temporary roads and/or reconstruction of Forest Development Roads or BLM/county. Proper initial location of these roads will expedite approval of the operator's lease or permit. Some of the factors which must be considered during location are:

Environmental Considerations. Select wildlife habitat, riparian zones, unstable soil areas, threatened and endangered plant locations, side slopes over 40 percent, wetlands, archaeological sites, sensitive visual areas, and watershed areas should be avoided when possible during location studies.

Geotechnical Considerations. Unstable areas, potentially unstable areas, and areas showing evidence of high moisture or free water should be identified and avoided. Soil classification samples should be collected and processed during this period for future road surfacing determinations. Aggregate sources should be identified, tested, and mapped. Roadway excavation areas should be tested to determine the steepest stable cut slopes that could be constructed.

Geometric Considerations. The geometric standards for each particular road must be considered during location. The standards are shown in Table B-7a.

### PRELIMINARY SURVEYS

The preliminary survey shall closely traverse along a line previously flagged by the operator and approved by the appropriate FS or BLM representative. Certain areas such as benches, wet areas, etc. may require exact conformance to flagged lines. Bisecting cross sections shall be taken at breaks in terrain, drainage areas, and at 100-foot intervals sufficiently wide to cover the entire clearing limits of the future road. Complete terrain cover, drainage systems, soil type, and land ownership shall be noted during the Preliminary Centerline Survey. A complete site survey shall be made at each major stream crossing. Any existing facilities, either operating or abandoned, crossed by the Preliminary Centerline shall be documented by station and orientation. Examples are powerlines, pipelines, roads, trails, fences, etc.

The class of survey required shall be defined by the BLM District Engineer and/or FS Engineer.

### DESIGN

Roads shall be designed by or under the direct supervision of a Registered Professional Engineer. BLM may on a case-by-case situation, waive this option "out on the flats". It will be followed where any ridges and side slopes are involved. All roads will be laid out at least by an experienced land surveyor on BLM lands.

General geometric design criteria are shown in Table B-7a.

Roads should be designed with the purpose of fitting the roadway to the terrain. This procedure will result in minimizing earthwork and disturbed area. The designer shall attempt to create a balanced earthwork project, thus avoiding the need for borrow areas and waste areas. Special care must be taken to compensate for the incremental grade on all switchbacks by holding a maximum centerline grade of four percent throughout the length of the switchbacks.

#### SLOPE SELECTION

The cut and fill slopes shown in Table B-7b, should be used as a guide only. The slopes shall be adjusted to uneven ratios in transition sections to prevent a zigzag appearance at the slope catch points. The top of cut or toe of fill line should be a smooth line with gentle curves. Slope ratios shall not exceed the maximum stable slope as determined by the geotechnical investigation. In areas where cut or fill will be the construction method, cross sections will be required in the plans.

TABLE B-7b  
CUT AND FILL SELECTION TABLE

Height (ft.)	Slope Ratio
0-5	3:1 (minimum)-BLM may require 6:1 ratio or larger
5-20	2:1
Over 10	1½:1

#### PAVEMENT STRUCTURE

The type and amount (depth) of road surfacing shall be determined by the engineer through a procedure based on projected traffic loadings, bearing capacity of the subgrade soils, and the anticipated loss due to traffic use and maintenance. A further factor which is to be considered is the time period in which the operator will be using the road. Section Period of Use

of this document defines the consideration which must be given this factor. The surfacing analysis shall be documented and shall become a part of the "road package" submitted to the FS or BLM for review and concurrence. If the minimum surfacing as stated under Forest and BLM Development Roads for arterials is used, documentation of this determination is not required.

An acceptable analysis may be as simple as comparing like soil types and structure depths (that are based on firm data from previous projects) to full laboratory analysis of subgrade materials using California Bearing Ratio (CBR) or R value tests. The level of analysis should be that necessary to assure the pavement structure depths will support the type of vehicle and volume of use anticipated. The depth of rock courses can be varied along the road to accommodate changes in subgrade bearing capacity.

#### TRAVELED WAY WIDTH

The width of the traveled way, i.e., the lane width plus shoulder width, is determined from Table B-7a. Accurate traffic projections combined with design speed or the facility are the determining factors for traveled way widths. The operator should establish the factors even prior to the time when road location efforts are undertaken, and review with and receive concurrence from the FS Engineer or BLM Authorized Officer prior to proceeding with the work. This information must be included in the road package when submitted to the FS or BLM (depending on land status) for review.

Curve widening shall be applied to the traveled way widths as required to accommodate the tracking characteristics of the design vehicle. The design vehicle shall be that vehicle commonly referred to as 3-3 or WB-50 as defined as AASHO.

#### CLEARING

Selective clearing may be required during earthwork to remove trees damaged by construction, particularly large trees at the top of cut slopes whose root systems protrude into the excavation zone. Care shall be exercised to prevent marring of trees by equipment. The Company will buy all timber on the road right-of-way.

All cleared material shall be disposed of through methods approved by the FS or BLM. Methods which may be approved are burning, burying outside the construction limits, decking of material for removal by the public for firewood, chipping, sale of merchantable timber to a mill, or other appropriate means, as suggested by the operator. The method to be utilized shall be identified in the construction plans and specifications.

#### DRAINAGE

Permanent drainage structures shall be installed to protect the road and adjacent watershed. Single lane roads shall have, as a minimum, armored drainage dips constructed in the roadbed to prevent water from channeling the road surface. Bridges, or occasionally culverts, shall be constructed in low flow drainages where stream and roadway geometrics permit. Culvert cross-drains shall be installed in all double-lane roads (drainage dips shall not be constructed on double-lane roads). They shall be located to accommodate natural drainage patterns and as ditch relief pipes. Culvert inlet basins will be required to install ditch relief pipes. The inlets shall have metal end sections and occasional elbows to provide proper installation. These pipes will extend to the toe of the fill slopes and erosion control devices or energy dissipators shall be utilized at the outlets.

Dips will be designed so that it will be apparent at the time the road is maintained that the dip is a permanent necessary feature of the road and is not an irregularity that can be smoothed out with a grader. Dips must be designed and not added as an afterthought. Slopes at the discharge point may need protection and should be greater than the slope of the road to prevent dips from filling with silt.

Where large natural drainage systems are encountered, a complete hydrological study of the system must be performed to predict the anticipated runoff.

As a minimum, culverts shall be designed for a 10-year flood (flow of 10-year recurrence interval) without a head at the entrance. They should also be designed to carry a 50-year flood without exceeding the allowable



headwater. The allowable headwater is the maximum water elevation for which the resulting flood damages are considered to be acceptable. Major culverts (end area greater than 35 square feet) and minor bridges (spans on the order of 30 feet or less) should be designed for a 20-year flood and checked for a 50-year flood. All other bridges should be designed to pass a 50-year flood and checked for a 100-year flood.

The hydrological study shall be included in the road package upon submittal to the FS or BLM for review and concurrence. After the road design is approved, five copies of the plans will be prepared and given to the FS or BLM.

## CONSTRUCTION

### STAKING

Construction controls will be staked on the ground for all roads. Staking will be in accordance with standard practices and include a marked centerline, Points of Intersection, clearing limits, cut and fill stakes, drainage structures, and reference hubs. The degree of construction staking will be determined by the FS engineer or BLM Authorized Officer. Minimum staking should include a referenced centerline, staked culverts and dips, and the cut catch point on slopes over 40 percent. Construction staking shall be done as described in Forest Service Standard Specifications for Roads and Bridges. No work shall commence until Forest Service or BLM approval of construction staking is completed.

### QUALITY CONTROL

The operator has the responsibility to ensure that each road is constructed according to plans and specifications approved by the FS or BLM. Forest Service Standard Specifications for the Construction of Roads and Bridges shall be utilized to establish and maintain construction standards. Copies are available from the Forest Supervisor's Office. The degree of construction control should complement the survey and design methods utilized. Lower standard surveys and designs may require more intensive construction engineering to assure an acceptable end product.

The FS or BLM will make periodic inspections to ensure that each road is properly constructed, at which time control tests and charts maintained by the operator shall be made available for review. This shall include density tests, aggregate gradations, photographs showing construction techniques, daily diaries, etc.

The normally accepted tolerances between the designed and constructed road are as shown in Forest Service Standard Specification 203.

Tolerances should be indicated on the project plans.

#### ROAD MAINTENANCE

The lessee's Operations Plan shall include a maintenance plan for all roads constructed or used by the lessee.

Users of Forest Development Roads shall pay their fair share of maintenance costs, and use of Forest Roads will be approved by FS road permits. This includes roads which lead to the area where additional access is needed. Lessees may either perform actual maintenance activities or pay cooperative deposits as the FS approves. Before a bond release is signed, all road damage caused by the user shall be repaired in a manner approved by the FS (this will not apply to BLM lands).

The maintenance plan should have definite provisions for preventing undercutting of cut banks and the unnecessary removal of established stabilizing vegetation on fill side of road (operators should be given special instructions).

#### OBLITERATION OF TEMPORARY ROADS

Upon abandonment and prior to when a bond release is signed, temporary roads shall be obliterated. All or part of the obliteration techniques that follow could be used depending on the EIS/EA direction. Obliteration shall commence by stripping the gravel course from the roadway surface by means of a scraper or by windrowing with a motor patrol and removal with a loader and trucks. The gravel may be stockpiled at approved sites. After stripping



the ground, obliteration shall consist of rough grading, ripping or scarifying, cross ditching, and opening drainages to prevent erosion and encourage revegetation. The work shall not commence until after the temporary road is no longer needed to serve traffic.

After rough grading and ripping have been completed, the abandoned roadway shall be cross ditched.

Live streams and other drainages shall be opened by removing the abandoned structures and grading the approach fills so they will not impair the stream flow.

Abandoned structures shall be disposed of in agreed locations.

All obliterated areas shall be revegetated by applying seed and fertilizer mixtures as approved by the FS or BLM.

Roadways to be obliterated in high scenic quality areas will require more intensive procedures than those described above and may include such work as refilling cut slopes, removing fills, transplanting trees and shrubs, and other techniques deemed necessary to completely restore the area.

Culverts, bridges, construction signs, and other materials furnished by the operator will remain the property of the operator on obliterated roads.